

432 MHz AND ABOVE EME NEWS

JULY 1999 VOL 27 #8

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CONDITIONS

It looks like we missed a good one on 70 cm. Although activity could have been better - it is the summertime - conditions were apparently quite good during the June SW. (We were in California during SW and thus can not comment 1st hand. We had hoped to get on the Moon from N6BQ's QTH, but Hoppy was back in the hospital with a blood clot problem. We visited Hoppy and found him in good spirit and itching to be on the Moon. He is now back home and planning for the July SW). Among the 1st's which occurred in June were a new 13 cm DX record (ZS6AXT to NU7Z) and on 70 cm EA3DXU hit the #100 mark with only 2 yagis. Also W1ZX is now QRV on 23 cm from MD.

ARRL EME CONTEST DATES

The dates for the contest are apparently still not settled! VE7BQH, Lionel writes that the date choices for the 1999 ARRL International EME Contest are: 2/3 Oct and 30/31 Oct, or 30/31 Oct and 27/28 Nov. Lionel feels that last year the dates recommended by the EME community were chosen to not conflict with the IARU Region 1 VHF Contest in Eur. Despite the best effort to accommodate terrestrial contest interests, there were still criticism from mid to northern Eur that the 2nd leg of the EME contest was too late into the winter with the result that the weather was and can be very poor. This year the situation is not quite the same, but has some similarities. 2/3 Oct and 30/31 Oct will provide the better expected weather for the Northern latitudes in Eur and NA. However, the 432 MHz & up IARU Region 1 UHF Contest is on 2/3 Oct. The other dates are free of any other contest dates, but the weather has the probability of being not good during the 2nd weekend. It is suggested that you send your opinion to Joel, W5ZN ASAP as this decision should have been made already. [I strongly support the 2nd option. Last year the contest was moved to Dec to avoid a conflict with the ARRL's Sept VHF Contest. I can not see how the ARRL can not do the same for the Eur stations this year.]

9H1ES

Fortunato reports that he is making progress on his new 10 GHz EME station. He now has his TWTA operating and believes he is getting 27 W, but is not sure of his VSWR. Fortunato hopes to be back on EME very soon.

AL7OB

Mike had similar results in June as in May -- I tried RW1AW and DK3WG on numerous occasions with nil results. RW1AW reported hearing me and sending (O). Tried with KB4CNI again and heard him (O) on 2 occasions, but he did not hear me, so no QSO. While trying to work Cowels, W7QX was hearing me FB. But he could not TX due to high VSWR. We arranged sked for later, and this time I could hear him (339), he could not hear me. I did work **W7HAH (O/O)** and copied K1FO (loud) near his moonset. He did not hear me. Nil was copied from WE2Y although John copied me (M). VE1ALQ (O/439) QSO - interrupted by high noise level, wind and rain. Nil was heard from HP3XUG. VK4AFL's signal was detectable (T), with the same situation at Trevor's end, he sent (T) also. On 432 I am running 16 x 12 el NBS 2.2 wl yagis, K2RIW 700 W PA, ARR .5 dB NF preamp and FT-736. I should have 1296 on the air by next month SW.

DL4KG

Gerald found 70 cm conditions fair with good echoes, but found nil activity from JA and NA -- Where were the JA and W/K stations? I worked **SM2CEW and DL9NDD**. Heard were DF3RU and OZ6OL was CWNR. [Gerald will be moving QTHs soon - see his last report.]

EA3DXU

Josep has been busy this year on 70 cm and now up to initial #100 -- During last few months I added initials with **W7QX for #90, N7LQ #91, KA0RYT/0 #92, N9AB #93, F5FLN #94, DL4MEA #95, W7HAH #96, JH4JLV #97, RW1AW #98, WA9FWD #99 and OZ6OL #100**. In March 1993 I started activity on 432 EME running only 2 x 38 el M2 yagis. K1FO was my 1st QSO. After 6 years, I am still using the same antenna. The only difference is that I am now running 950 W from a GS23B PA. This past month I finally crossed the #100 mark. I may be the first station to reach this level running with such a small array. [I think that you are the 1st to make 100 initials with only 2 yagis.] Over the 6 years I have been QRV, I completed 389 QSOs (305 on random and 84 on sked). 74 initials were worked on random and many worked 1st on sked and then on random. 26 more worked on sked only. 14 stations QSO'd were running only 4 yagi. 5 of these were worked on random - 2 yagi/4 yagi QSOs are quite usual in my log. Also stations running 5 m dishes are unusual in my log. Up to now 2 yagi to 2 yagi QSOs have not been possible. I do hear my echoes from time to time and would like to try some 2Y/2Y skeds - any takers? I still need SA for WAC and hope to complete with PY5ZBU soon. I have 26 DXCC and 20 USA states. EME with 2 yagis is not easy, but with patience and perseverance it is possible to do a very fine job.

G3WDG

Charlie writes that he was on for his June 3 cm skeds -- We were QRV and listening to the NL skeds, but did not hear any of the sked stations. We did hear a new station believed to be IW4ZTJ at (T-M) copy. I am pretty sure of the call, but might have made a mistake. Has anyone heard of them? They were echo testing a lot so they must have a system that allows them to hear their own echoes. We called them but only got a QRZ, and later an (M) report, but we never copied our own call.

G4DZU

Doug writes -- It's been a long time since I've been QRV on 23 cm EME with my 10' dish and about 800 W. Finally I have everything working again. I now have a VE1ALQ optical position board working with the VK3UM software. I was QRV on 19 June. A number of stations were heard and 2 QSO'd. However, that evening, the contacts on the relay controlling the dish welded together. I cancelled my sked with K3HZO as I didn't want to waist his time. As it turned out, I managed to get everything working again and listened at sked time just in case he was on. Nothing was heard, just my echoes, so I presumed he received my e-mail. Earlier I QSO'd **K5JL (549/549)** and **HB9BBD (549/559)**. I should be active again for the next SW.

HA5SHF

Csaba's group's June results on 1296 follow -- Worked on 19 June at 1705 **HB9BBD (579/559)** and on 20 June **1245 JA7BMB (M/O)**, 1300 nil 4X6UJ, 1330 nil I5MPK, 1400 nil I6PNN, 1430 nil HB9BHU, 1542 **VHB9SV (579/549)**, 1730 nil VE3BQN - Ted writes that he is not QRV, 1733 **F1ANH (O/O)**, 1830 nil LU6DW - Marc writes he is not presently QRV, 1900 nil WA8WZG, 1930 nil K9BCT and 2030 nil W4OP.

K1FO

Steve found a bit of time to get on EME in June. He was QRV during the ARRL VHF contest, but found no 432 EME. During the June SW he found conditions phenomenal. He doesn't ever remember hearing echoes so strong during the warm weather months. If anyone experienced bad conditions, it must have been due to polarity misalignment as polarity was very sharp. Steve worked on 16 Jun **JA5OVU**, on 19 Jun **KB4CNI**, **W7CNK**, **JA3SGR**, **JA5NNS**, **JA5OVU**, **JA3SGR** again and **JA6AHB #550** - from new QTH. Steve notes that he has worked **JA3SGR** a number of times on random and believes that JA3SGR is still running a single yagi and 500 W. On 20 Jun Steve added **EA3DXU**, but was disappointed at the low Eur activity on Saturday. He intended to get on again on Sunday, but got tied up doing other things. Steve QSO'd back on 23 May **DL8OBU**, **DF3TU** and **RW1AW#549**.

LU6DW

Marc sends news from LU land -- We will be back on 1296 EME very soon; only the elevation readout for the 6 m dish is still not finished. We have installed a B&W TV camera for display of both the el and az readings. We have measured up to 18 dB of Sun noise with a flux of 170. KB2AH's 4 tube amp arrived OK, but will not be operational for some time as we need to construct power supplies, cooling, etc for it. I am working on a 2 x 2C39 water cooled amp (cavity by DL4MEA), which is almost finished. Photos of the dish can be seen in my web page:

[LU6DW](#).

Regarding the Rio 2000 EME Conference, Daniel, LU8EDR, Mariano, LW6EHZ and myself will be assisting. It is going to be a great event, and I am looking forward to being there with all the EME fellows from around the world.

[ON5RR](#)

Marc had a bad, bad weekend and very little contribution -- We were active on 1296 on 19 June, but heard nil during our sked with JF3HUC. We also listened for several hours, but no activity was spotted and measured 17 dB of Sun noise. On Sunday, the day of all my skeds, the WX changed. Rain and wind came pouring from the coast. I was even not able to start up the station. Sorry to all the stations listening for our call. I hope to be active the next SW.

[OZ4MM](#)

Stig writes -- I am finally back after several months absence from EME, because of rebuilding the kitchen and additional rooms in the house. Last Saturday on 19 June I was receiving on 432 and heard several stations, but noted a lack of activity. I missed RW1AW, who had a great signal. When he finished his last sked and I had hoped to catch him on random, but we had a visitor and I had to close down. On Sunday, 20 June I was again on 432 at moonrise, looking for RW1AW but didn't find him. Instead I worked was [SM3AKW \(549/559\)](#), [JA5NNS \(559/559\)](#), [JA6AHB \(549/559\)](#) for initial #182, [JA4BLC \(549/559\)](#), [DF3RU \(569/569\)](#) and [JS3SIM \(549/549\)](#). Then I switched to 1296 and heard several stations during the afternoon. In the evening I discovered that the PA water pump was not running! The pump had failed as a result of its several month of idleness - hi. So I never really got on 1296 in June, but expect to be on next activity month. I am missing several (in fact many) EME QSL cards. Please ask stations owing me cards to respond!

[OZ6OL](#)

Hans was QRV on 432 again in June. He added initials with [EA3DXU](#) and [W7HAH](#) among other QSOs.

[SM2CEW](#)

Peter's NL report for June -- I was active on 432 both days and found conditions good. I worked the following stations: **DL4KG, G4RGK, OE3JPC, W7CNK, DL9NDD, RW1AW for initial #358, G3LTF, DF3RU and KD4LT**. I tuned to 1296 on Saturday evening and heard W1ZX with a good signal working K5JL. I had everything tuned up on 432, so I did not QSY. On Sunday evening I was QRV on 1296 and worked the following stations: **HB9BBD, K5JL, EA3UM and ZS6AXT**. Heard among others were G4DZU and HB9SV with good signals, but did not hear W1ZX again. I will be looking for him next SW.

VK4AFL

Trevor rites -- I am dismantling my present antenna to make way for a new array, which is now completed but in subassembly form. Everything is new (apart from the preamp/relay box) including the tower and rotators. I expect final assembly and testing to take 5 to 6 weeks, which will preclude any July SW skeds. My target is to be back on by the Aug SW. The replacement array is 16 x 4 wl WU yagis with full polarity control. It has been a very big (and expensive) project but with the end hopefully in sight. I have learned that fixed polarity is a big disadvantage. Power will remain the same, (approx 600 W at the array).

W1ZX

Willie is now QRV on 1296. He worked 4 stations (**KB2AH, K5JL, W2UHI and W6HD**) on Saturday of the June SW. Willie plans to remain QRV on 23 cm for next few SWs.

W7HAH

Shep had good results on 432 in June -- During the 19/20 June SW I worked **AL7OB (O/O) for initial #205, VK4AFL (O/O) #206**, nil JA5NNS, **G4RGK (O/O) #207, DJ3FI, GD4IOM**, nil KB4CNI, OZ6OL O/O #208, nil LU4HO and nil HP3XUG. I understand that Louie, HP3XUG was out of the country and will not be back in Panama until Sept. I found conditions fair, but think that some of the stations do not get the skeds or ignore them. I am always open for skeds.

ZS6AXT

Ivo reports -- On Sunday 13 June we made it with NU7Z (M/O) for initial #30 on 2304 MHz. I believe this QSO is a new world DX record for this band! We had only short window, thanks to Rick's overgrown trees. Rick's signals were (319) in the beginning and up to (429) before I hit the horizon noise. He heard me (519). The distance is 16,480 km. Does anyone know of a farther QSO? On Saturday 19 June, activity was very disappointing on 23 cm. I worked **HB9BBD, OH2AXH, KB2AH and K5JL**, and heard JA6CZD, DF4PV and W6HD. On Sunday 20 June, I added **OZ6OL, SM2CEW, K5JL and W2UHI**, and heard HB9BBD, G4DZU, K5JL, WA8WZG and HB9SV. All with very good signals, though there was some QSB on occasions. I am finishing up needed work around the house, like painting of the garage roof (over 120 m²), etc. It is our dry season, but quite

cold, (0 deg C in the mornings). When I am finished, I will try again with my 6 cm system. I heard from ZS6JON. He is putting finishing touches to his EME system. He will probably be QRV 1st on 70 cm with QRP before going for 23 cm. He is only about 5 km from my QTH and has a 5.5 m dish.

NETNEWS

K6IBY has a new e-mail address:

[K6IBY](mailto:k6iby@earthlink.net)= k6iby@earthlink.net

His 432 system is complete and he expects to be ready for skeds for the July SW.

W7QX has been plagued by many small problems - preamps, relays, coax, etc. However he did hear AL7OB.

K6DV is not ready on 23 cm yet. One of his drive motors has failed.

WD5AGO will be mounting another dish in the next month or so. It will be smaller, but have better surface for higher band operation.

HP3XUG will be off the air until Oct. Louie will be visiting Alaska during his travels.

PA3CSG worked RW3BP on 10 GHz.

W7SZ will be back on 70 cm in a couple of weeks.

WA1JOF is looking for K5JL on 23 cm.

KD4LT reports that his 23 cm dish drives are not working. Scott has a new 70 cm preamp ready to try out.

W2UHI is still working on his 10 GHz system.

VE1ALQ, Darrell worked VE4MA on 5.7GHz with good signals.

W0RAP is recuperating from medical problems.

W7CNK is working on 5.7 GHz EME.

KA0RYT missed his June SW RW1AW sked.

WA9FWD is still using tin can feeds and needs to upgrade. He may try a rectangular feed.

HB9BBD reports that all is working fine. He was active during the SW and had good fun QSOing K5JL (539) running only 3 W. W5LUA has a new e-mail address:

[Al Ward,W5LUA](mailto:al_ward@am.exch.hp.com)= al_ward@am.exch.hp.com

CT1DMK/CU7 will put the Azores back on 432 EME. Luis should be on in a year or so from this location. He will let us all know when activity starts.

DL9KR reports that the 3V8AA dxpedition is postponed until next year. Jan worked JA6AHB from his new location for initial #716 and is looking for a QSL address.

N6BQ does not expect to be QRV before Aug with his 5 m dish.

I5TDJ has been QRT for a few months, but is now back on the EME net.

W0KJY is trying to become more active off the Moon.

ON5OF is heading home after 3 weeks of traveling. He met up with Sergej, UR5LX in Germany and now has cavities for 70 cm and 2 m using GS35b tubes.

RX3QFM, Vlad, is looking for info on a VE9 dxpedition – none is known at this time.

FOR SALE

W1ZX has available a **General Radio 1236 30 MHz IF Amplifier** for \$US150 + shipping (s), a **General Radio 1216A 30 MHz IF Amplifier** \$US60+s, **MFJ-784 Super DSP filter** \$US135+s, **HP 415E SWR Meter** - brown unit (later build unit) \$US85+s, **Noise Com Noise Diodes NC305, glass package** \$US33+shipping, flat package \$US 42+ shipping. Call Willie at 301 645 5584 between 2000-2300 EST, FAX 301 645 6853, 24 hrs, E-mail:

[W1ZX](#)

N6BQ is **looking for James Millen HV connectors - 6 black and 6 red connectors.**

W7QX is **looking for APC7 to type N; female adapters.**

K0YW is looking for a 16 to 20' dish for use on 23 cm.

KL7HFQ has access to 1.6 to 3.2 GHz LNAs.

PA3CSG is still looking for a HP-8555A plug in.

TECHNICAL

This month we have the first in a series On Getting the Goo by K5JL which describes mods to the TH-327, Cavity for 1296. Jay has compiled a series of notes telling how to get this popular cavity to produce the outstanding signal heard from K5JL.

EME2000 RIO

The conference WEB Page is now active. The site is:

[EME2000](#)

Don, PY5ZBU intends to show 6 or more different active EME station's antennas each month in the WEB page. He needs pictures from EMEers with their callsigns, which should be of good definition to be scanned or alternatively sent to him in digital form. Don also needs information on articles to be eventually published in the conference proceedings. For example: - Title, - Approx. Number of pages (A4), - Approx. Date when ready, - Authors, etc.

FINAL

Disaster struck K1RQG this month. His computer self "destructured" and his backup was less than complete. To say that Joe was a bit frustrated is inadequate! As a result the Netnotes are a bit thin this month. He has built up another one, but has not completely recovered all the files and programs that were lost.

During our visit to CA we had the opportunity to visit W6PY (x- SM0PYP) at his new QTH near San Diego. Paul's home is located on a hilltop with a spectacular view of the surrounding valleys. He has been expending much of his energy on turning his home into a virtual palace, but has not given up on EME. He still has

his big dish from Sweden and several smaller dishes for the microwave bands.
Paul will be QRV before long with a big Moon signal.

Because of the short turn around this month, only 3 weeks between SW's, this NL
and the list of skeds are not that long. I expect things to be back to normal in
Aug. Keep the info coming. I hope to CU you soon off the Moon.

73, Al - K2UYH



EME SKEDS

10 JULY

Time 432.040

1200z KA0RYT-RW1AW

11 JULY

Time 1296.050

1200z VE1ALQ-HA5SHF

1230z G4DZU -HA5SHF

10 JULY

Time 2304.050

1330z OK1KIR-NU7Z

1400z HB9SV -NU7Z

1430z DF3RU -NU7Z

11 JULY

1300z IK2RTI-NU7Z

1330z DF9QX -NU7Z

Modifications to the TH-327, Cavity for 1296 MHz

by K5JL

I hope some of the following may help you in the final assembly and firing off the TH-327.

We had all hoped that the Cavity - as built - would be more or less a Plug and Play Device. Many hours of work on the project as proven otherwise. Many thanks must go to Darrell -VE1ALQ- and Scotty -KD4LT- for their contributions to this project.

LOOSE HEATER CONNECTION

So far - all that have examined the cavity have found loose heater connections. I found this true when I first received the cavity. (repair was made) and again after operation of the cavity. These are the connections that go to the cathode and filament through the plastic feed-thrus. The plastic has a very low temp melting point. When heat is applied to solder the heater lines the lugs actually melt into the plastic, causing the feed through to become loose. (as large wire is required to carry the necessary current - a large amount heat must be applied to the wire and thus the lugs). I have found that the lugs actually melt into the plastic on both ends of the plastic feed through, which will cause a loose connection. When heater voltage is applied the poor connection causes more heat and soon you really have a serious problem.

To prevent this problem I removed the screw and outside lugs from the feed through. Then attached the heater wires to the lugs and re-assembled the feed through. I used heavier lugs that were supplied with the cavity in hopes that I would get a better connection (at least on the outside). To do this I found it necessary to removed the plastic handle from the tuning rods and also remove the 5 small screws holding the bottom of the cathode compartment. Once removed the bottom of the cathode compartment may be slipped out over the tuning rods, thus giving ample working room.

INSERTING THE TUBE INTO CAVITY

When inserting the tube into the cavity - care must be taken not to push the screen tube away from the anode section of the cavity. The screen tube is held in place by 3 screws located just below the anode section of the cavity. These screws could be loose or in some cases by pushing hard to seat the tube the screen tube could slip or be pushed down. (See Notes below on Cavity Mods)

ALIGNMENT OF ANODE FINGER STOCK RING:

In some cases the anode ring which contains the anode finger stock has to been removed. (such as to replace the dielectric material) It should be noted that the 5 insulators are NOT self centering. There is considerable play that will let the anode ring move around and not properly center. When inserting the tube - leave

the 5 screws loose and let the anode ring center its self when the tube is inserted. Then lightly tighten the five screws. There has been one case when the anode ring was not centered and when the tube was removed - it caused the finger stock in the anode ring to fly apart and break up to a point that it was unusable.

CAVITY MODIFICATIONS:

Modifications have had to be made at both K5JL and KD4LT before the Cavity could be placed in operation. In a nut-shell the tube could not be properly inserted into the cavity without the following modification. If you measure the distance center of anode ring to center of screen ring on the tube, the distance is 19mm. With the 3 screws that hold the bottom of the cavity loose and that section of the cavity pushed all the way up into the anode section of the cavity it was found that the distance from the anode finger stock to the screen finger stock was in excess of 24 mm. This would let the anode ring on the tube slide past the anode finger stock and not even make contact with the anode finger stock. (To see if you have the same problem loosen the 3 screws just below the anode compartment of the cavity and push the input section of the cavity all the way up into the anode compartment). There is a notch milled out that the input connector wall slide up into. When you move this part of the cavity it moves the screen ring, grid ring, cathode ring, and heater ring all together. Push it up and measure the center to center distance from the anode finger stock ring to the screen finger stock ring. It will be about or in excess of 24 mm instead of the proper distance of 19 mm.

You will note that when the input section is pushed all the way up that the input connector will touch the milled out notch and there is about an additional 3 or 4 mm that may be ground or milled off of the ring on the bottom of the cavity. By milling off this additional metal until the notch for this input connector is flush with the bottom of the cavity the center to center distance of the anode and screen ring can be reduced to about 20 mm.

Yes, to make this mod the whole cavity must be taken apart and the input section removed from the bottom of the anode section of the cavity. Just clear a work space and go to it. Be sure to unsolder the yellow wire that connects to the grid ring. (It will re-align ok) This grid ring must also be removed (6 set screws) You may or may not have to remove the cathode and heater tubes at this time. If you do remove the cathode and heater rings - be careful as you pull this out as the finger stock that slides against the screen tube as it will fly all over. In most cases it has been in two or more pieces. You will also find another piece of finger stock that the screen tube slides on. (This can be removed and discarded - not necessary).

While the cavity is apart - **REPLACE THE ANODE BYPASS CAP** - The cavity is shipped with either 5 mil Teflon or Kaplon. All five amps that have been fired

up have blown a hole in the 5 mil. Use either 10 mil Teflon or 2 pieces of good 5 mil Teflon or Kaplon or even better us a piece of Ultem. If you blow this bypass you will also blow a hole in the cathode bypass (which is 2 mil Kaplon) and blow the 2 mil Kaplon in the input tuning . In addition to all of the above I created a short between my HV filter choke and ground. **DON'T EVEN THINK ABOUT FIRING UP BEFORE A NEW ANODE BYPASS IS INSTALLED.**

When the above mods are completed re-assemble the cavity. Carefully insert the tube into the cavity. The tube should bottom out on the screen ring and the anode ring of the tube should now be about 1mm below the top of the anode finger stock ring. When the tube bottoms out on the screen ring, it should also bottom out on the heater ring. So far this has not been the case and now is the time you must adjust the cathode and heater tubes to be sure you are also at the bottom of the heater ring with the tube at the bottom of the screen ring. The cathode tube is held in place by 3 counter sunk setscrews. To get to these set screws you must remove the 5 screws that hold the input compartment to the screen tube.(Input compartment hold the cathode bypass and is where the cathode, heater and grid connections go in) This may be pulled down about 1/4 to get to the 3 set screws holding the cathode ring. You will probably have to take the bottom off of the compartment and loosen the screws that hold the grid, heater, and cathode bypass caps or you will break their leads when you pull the compartment out to get to the set screws. You can actually cut out the 3 bypass caps (the blue ones) as they are not needed.

With the setscrews loose - push the cathode tube (heater tube is connected to it) all the way up so that the heater ring of the tube now hits bottom of heater contact on socket. Tighten the 3 setscrews and re-assemble.

I found that when the tube is not installed in the cavity - there is a short from grid to cathode, do to the cathode finger stock touching the grid finger stock. When the tube is installed this short goes away as the finger stock is properly positioned by the grid and cathode rings on the tube. By now like Scotty and I you will be able to take the cavity apart blind folded. You are ready for Goo....

FIRING UP

Once all mods have been make you are ready to light it off. This should go quite normal now. The input tuning rods will tune about one inch out. By setting the input tuning and with the proper placement of the input connector (about 3/16 inch from all the way in) you can obtain no swr. Play with both adjustments until you have no swr. (swr on the input will cause excess heat) This adjustment can be make without plate or screen voltage on the tube. Once you find this point no further adjustment on the input is necessary.

The output probe shows optimum very far out (nearly to wall of cavity) We think

we know why this is and will follow up on it at a later time. Plate tuning is very sharp and tunes with about 34mm of the probe sticking out.

With 3kv on the plate, 480 volts on the screen and 75 volts of grid bias, my idling current is about 200 ma. 130 watts of drive will increase the plate current to 1.1 amps, 20 mils of screen current and just a few mills of grid current. Additional drive will saturate the tube at about 20 ma grid, increase screen current to about 30 ma's and plate will go to about 1.2 amps. Further drive at this point only saturates the tube. If you want more output you will have to raise the screen and grid voltage, but remember the limitations of the grid bypass cap.

[Learn about the upcoming EME Symposium.](#)

[EME 2000, the upcoming EME conference in Rio, Brazil.](#)

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